UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/594,868	09/28/2006	Klaus Rose	14055.0004FPWO	8198

23552 7590 10/03/2011

MERCHANT & GOULD PC
P.O. BOX 2903
MINNEAPOLIS, MN 55402-0903

EXAMINER	
HORNING, JOEL G	

ART UNIT	PAPER NUMBER
1712	

MAIL DATE	DELIVERY MODE
10/03/2011	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/594,868	ROSE ET AL.	
	Examiner	Art Unit	
	JOEL HORNING	1712	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07 July 2011*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-7 and 9-20* is/are pending in the application.

4a) Of the above claim(s) *14-20* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7 and 9-13* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *07-07-2011*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. **Claims 14-20** are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected inventions, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on June 22nd, 2009.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

2. **Claims 1-7 and 9-13** are rejected under 35 U.S.C. 103(a) as being unpatentable over Haas (Surface and Coatings Technology **111** (1999) 72-79, as supplied by applicant) in view of Linden (WO 03/066933) in view of Goodwin (WO 03086031).

Haas is directed towards making inorganic-organic hybrid polymer material coatings (ORMOCER®s) via a vapor phase deposition process (Section 1: Introduction). It teaches making these films by a hybrid process where a liquid phase process first forms organic/inorganic cross-linked prepolymers by sol-gel processing. Then the material is spray deposited onto a substrate where it is further disassociated and then crosslinked by using heat or light to create the desired degree of crosslinking and as a result the desired properties in the film (Section 2 and figure 2). However, Haas does not teach performing the disassociation and crosslinking by spraying the prepolymer though a plasma, instead spraying it and then curing it.

Linden is also directed towards making inorganic-organic hybrid polymer material coatings (ORMOCER®s) (page 4, lines 1-20). It teaches that such coatings are, like Haas, normally sprayed onto a substrate where they are then cured. However, Linden further teaches that such processes require many processing steps, long curing periods, prolonged preserving steps and large amounts of solvents. Linden teaches that by plasma activated vapor depositing the hybrid material, these problems can be avoided and an improved coating can be deposited (page 1, line 24 through page 2, line 19). In its improved process, Linden teaches that almost any organic substances can be used as the precursor (page 7, lines 8-12) including organosilicon previously polymerized compounds, which can supply both the inorganic and organic components of the deposited material (page 9, lines 1-14).

Thus it would have been obvious to a person of ordinary skill in the art at the time of invention to modify the process of Haas by plasma depositing the prepolymer compound formed by a sol-gel method, in order to gain the reduced processing time, processing steps and reduced amounts of solvents used in the process.

Linden teaches that the source of the plasma is not particularly limited by type (e.g. DC, RF, microwave; page 7, lines 6-7), but it does not specifically teach using a dielectric barrier discharge plasma.

Goodwin et al is also directed towards a process for depositing coatings on substrates. An atomizer is used to introduce an aerosol of a precursor for a coating forming material into the plasma [0019]. A substrate to be treated is introduced between these electrodes while the atmosphere is being controlled to generate a plasma discharge [0051], the aerosol precursor material is introduced into the plasma discharge [0052], so that a coating is deposited on the substrate [0053]. Goodwin et al further teaches using different precursors depending upon the desired film, including precursors to make hybrid inorganic/organic pre-polymer) [0040, 0046]. However, the process is performed in a system where the plasma is generated by two electrodes with a dielectric plate between them (which is what a dielectric barrier discharge is) [0019]. Goodwin teaches that other plasma discharges are required to operate at low pressures, increasing costs and reducing throughput [0012], however, this process allows the plasma to be formed at atmospheric pressure [0019].

Thus it would have been obvious to a person of ordinary skill in the art at the time of invention to specifically use a dielectric barrier discharge process as taught by Goodwin in the process of Haas in view of Linden, since it was known to be suitable for that plasma polymerization of hybrid organic/inorganic materials from similar precursors and in order to allow the process to be operated at atmospheric pressure and thus increase the throughput and reduce the costs of the process **(claim 1)**.

3. Regarding **claims 2 and 10**, Goodwin et al teaches that mixtures of different precursors (e.g. gases and vapors) can be added together to the plasma discharge in order to further tailor the physical properties of the coating to meet particular needs [0040]. Additionally, inorganic colloidal metals can be added in order to improve conductivity or optical properties of the resulting film [0046].

   Thus it would have been obvious to a person of ordinary skill in the art at the time of invention to supply different additional components (gases and vapors and inorganic colloidal metals) to the plasma discharge in order to further tailor the properties of the resulting film, as it known to the art **(claims 2 and 10)**.

4. Regarding **claim 3**, aerosols are mixtures of solids or liquids with gases. As shown in figure 3 of Goodwin, the aerosol creating spray nozzle **74** produces an expanding fan-like spray [0052], thus the volume fraction of liquid or solid in the aerosol will decrease as the distance from the nozzle increases (the fluid volume is being diluted by an increasing volume of the gas in the aerosol). This is a compositional gradient in the pre-polymer material in the aerosol. Thus it would have been obvious to a

person of ordinary skill in the art at the time of invention to have such a compositional gradient since it is a consequence of using the taught equipment.

5. Regarding **claim 4**, the Goodwin et al teaches that the dielectric barrier discharge process takes place at atmospheric pressure (abstract), which is within applicant's claimed range.
6. Regarding **claim 5**, Goodwin et al teaches that the dielectric barrier discharge uses a frequency of 29kHz [0061], which is within applicant's claimed range.
7. Regarding **claims 6**, Haas teaches that the substrate can be a plastic film (section 3.4.2).
8. Regarding **claim 7**, the coating is taught to modify the properties of the substrate, for example, Haas teaches modifying the gas diffusion barrier properties of the substrate film by depositing the hybrid organic/inorganic coating (section 3.4.1).
9. Regarding **claim 9**, Haas teaches forming the pre-polymer from tetraethoxysilane (fig 3, top left molecule).
10. Regarding **claim 10**, Goodwin et al further teaches that the pre-polymer mixture can also comprise colloidal metals [0046].
11. Regarding **claim 11**, Goodwin et al further teaches that in order to produce a glow discharge diluent gases such as argon are typically added to the plasma discharge in order to create a homogeneous glow discharge [0011].
12. Regarding **claim 12**, Goodwin et al further teaches that the precursor in such a plasma deposition process may be applied as a liquid [0039].

13. Regarding **claim 13**, Haas does not teach using a moving material web for the substrate. However, Goodwin et al teaches that the substrate useful for depositing layers can be a moving web [0017, 0022, 0024, 0025].

Thus it would have been obvious to a person of ordinary skill in the art at the time of invention to deposit the films of Haas onto a plastic moving web, since such substrates were known as desirable substrates for such dielectric barrier discharge processes, and would produce only predictable results **(claim 13)**.

14. **Claims 3** is additionally rejected under 35 U.S.C. 103(a) as being unpatentable over Haas (Surface and Coatings Technology **111** (1999) 72-79, as supplied by applicant) in view of Linden (WO 03/066933) in view of Goodwin (WO 03086031) as applied to claim 1, further in view of Chow et al (US 20020031658).

Goodwin et al further teaches that the deposited (organic/inorganic) layers can be formed into multilayer coatings on its substrates [0044], but does not teach how the interfaces between those layers should be formed.

However, Chow et al is also directed towards the spray deposition of organic-inorganic hybrid materials [0013] through aerosols [0032]. It teaches that by varying the composition of the precursor feedstock supplied during spraying , a fine composition gradient can be formed in the coating (abstract), which increases the compatibility of hybrid multilayered materials [0027] and can enhance the thermal, chemical and mechanical stability of the multilayer coatings and enhance control of their properties [0033].

Thus it would have been obvious to a person of ordinary skill in the art at the time of invention to supply a compositional gradient in the supplied aerosol precursor during deposition in order to form graded interfaces between the different layers in a multilayered coating in order to increase the layer compatibility, improve the stability of the resulting film and in order to better control the properties of said film **(claim 3)**.

Response to Arguments

15. Applicant's arguments with respect to claims 1-7 and 9-13 have been considered but are not convincing in view of the new ground(s) of rejection necessitated by applicant's amendments.

16. Applicant first argues that Haas does not teach vapor phase coating of hybrid inorganic/organic (ORMOCER®) layers. The examiner appreciates applicant's notice of the oversight. The language of the rejection has been modified to clarify the teaching of Haas and Linden, but the nature of the combination has not been changed.

17. Applicant then states that Linden teaches depositing a hybrid organic/inorganic coating and specifically a chemical vapor deposition process.

18. Applicant argues that neither Linden nor Goodwin specifically teach using hybrid organic inorganic cross-linked pre-polymers as the precursor. However, neither Linden nor Goodwin are being used to teach that precursor. Linden and Goodwin teach improving the process of Haas. Haas is being used to teach such a precursor.

19. Applicant then argues that the precursors are completely disassociated in the process of Linden. Linden only teaches that some inorganic precursors completely

disassociate in order to form inorganic phases. Organic precursors and hybrid organic/inorganic precursors (page 9) are not taught to completely disassociate. Linden rather teaches that the organic precursors are activated and combined with each other, not completely disassociated (e.g. page 6, line 26 through page 7, line 5).

20. Applicant then argues that the ORMOCERS® of Linden are not the same as the ORMOCERS® of Haas. This is not dispositive to the case, and as stated in the rejection, both references are directed towards processes for depositing hybrid organic/inorganic films. ORMOCER®s specifically are not required by the claim, nor by the art applied. The term is trademarked, so the office is treating it as such when referencing it.

21. Applicant then argues that the examiner has not motivated a person of ordinary skill to improve the process of Haas by the teaching of Linden and by the teaching of Goodwin. However, as stated in the rejection, the examiner has specifically motivated the combination in order to provide specific, predictable, benefits taught by the art outside of applicant's specification. Applicant has not argued them.

Conclusion

22. No current claims are allowed.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JOEL HORNING whose telephone number is (571)270-5357. The examiner can normally be reached on M-F 9-5pm with alternating Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael B. Cleveland can be reached on (571)272-1418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/JOEL G HORNING/
Examiner, Art Unit 1712

/David Turocy/
Primary Examiner, Art Unit 1717